

Appl. No. : 10/757,178
 Filed : January 14, 2004

AMENDMENTS TO THE CLAIMS

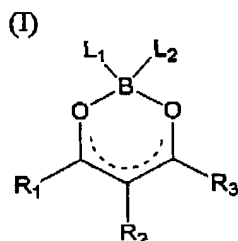
Please amend Claims 1 and 22 as follows and add new Claim 25 as follows:

1. (Currently amended) A composition comprising a polydioxaborine having a weight average molecular weight of about 1,000 or greater and an NLO chromophore.

2. (Original) The composition of Claim 1 that is photoconductive.

3. (Original) The composition of Claim 2 that is photorefractive.

4. (Original) The composition of Claim 1 in which the polydioxaborine comprises a dioxaborine group of the formula (I):



wherein R₁, R₂, R₃, L₁ and L₂ are each independently selected from the group consisting of hydrogen, linking atom, electron withdrawing group, and electron donating group.

5. (Original) The composition of Claim 4 in which R₁, R₂, R₃, L₁ and L₂ are each independently selected from the group consisting of a hydrogen atom, a linking atom, C₁-C₁₀ alkyl, and C₆ - C₁₀ aryl.

6. (Original) The composition of Claim 4, in which

L₁ and L₂ are each independently selected from the group consisting of hydrogen, linking atom, halogen, C₁-C₆ alkyl, C₁-C₆ alkoxy, C₁-C₆ thioalkyl, nitrile, and a bridging ligand formed by L₁ and L₂ together;

R₁ and R₃ are each independently selected from the group consisting of hydrogen, linking atom, carboxylate, carboxylic acid, aldehyde, amide, epoxy, acid chloride, anhydride, nitrile, sulfonate, sulfonic acid, phosphonate, nitrate, nitro, C₁-C₁₈ alkoxy, C₁-C₁₈ alkyl, C₁-C₁₈ fluoroalkyl, hydroxyl, C₁₂-C₂₀ diarylamino, C₂-C₁₀ dialkylamino, C₁-C₆

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alkylhalide, C₁-C₆ nitroalkyl, C₁-C₆ alkanolic acid, C₁-C₆ alkylamide, C₆-C₁₀ aryl, C₆-C₁₀ aryloxy, C₇-C₂₀ alkylaryl, and C₇-C₂₀ alkylaryloxy; and

R₂ is selected from the group consisting of hydrogen, linking atom, carboxylate, carboxylic acid, aldehyde, amide, epoxy, acid chloride, anhydride, nitrile, sulfonate, sulfonic acid, phosphonate, nitrate, nitro, C₁-C₁₈ alkoxy, C₁-C₁₈ alkyl, C₁-C₁₈ fluoroalkyl, C₁₂-C₂₀ diarylamino, C₁-C₆ alkylhalide, C₁-C₆ nitroalkyl, C₁-C₆ alkanolic acid, C₁-C₆ alkylamide, C₇-C₂₀ alkylaryl, and C₇-C₂₀ alkylaryloxy.

7. (Original) The composition of Claim 4 in which the linking atom is selected from the group consisting of carbon atom, nitrogen atom, oxygen atom, and sulfur atom.

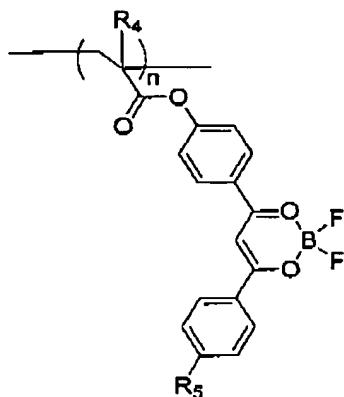
8. (Original) The composition of Claim 4 in which L₁ and L₂ are each independently a halogen selected from the group consisting of fluoro, chloro, and bromo; R₁ is a linking atom, R₂ is hydrogen, and R₃ is selected from the group consisting of hydrogen, C₁-C₁₈ alkyl, C₁-C₁₈ alkoxy, C₆-C₁₀ aryl, C₆-C₁₀ aryloxy, C₇-C₂₀ alkylaryl, and C₇-C₂₀ alkylaryloxy.

9. (Original) The composition of Claim 4 in which only one of R₁, R₂, R₃, L₁ and L₂ is a linking atom.

10. (Original) The composition of Claim 4 in which two of R₁, R₂, R₃, L₁ and L₂ are linking atoms.

11. (Original) The composition of Claim 1 in which the polydioxaborine comprises a recurring unit of the formula (II)

(II)

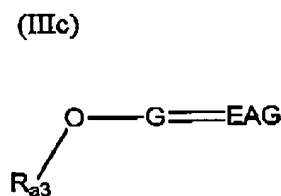
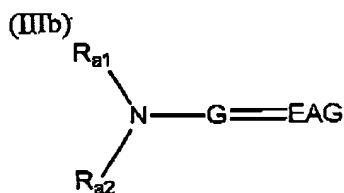
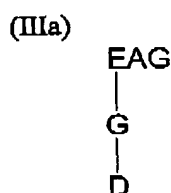


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in which R_4 and R_5 are each independently selected from the group consisting of a hydrogen atom, C_1 - C_{10} alkyl, and C_6 - C_{10} aryl.

12. (Original) The composition of Claim 1 in which the NLO chromophore has a photorefractive figure of merit of about 1×10^{-49} esu or greater.

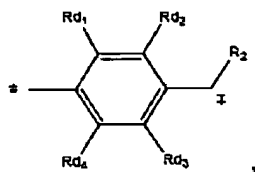
13. (Original) The composition of Claim 12 in which the NLO chromophore is a compound having a formula selected from the group consisting of formula (IIIa), formula (IIIb), and formula (IIIc):



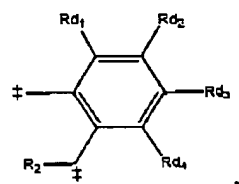
in which R_{a1} , R_{a2} , and R_{a3} are each individually selected from the group consisting of a hydrogen atom, C_1 - C_{10} alkyl, and C_6 - C_{10} aryl; G is a π -conjugated bridge; and EAG is an electron acceptor group.

14. (Original) The composition of Claim 13 in which G is represented by a structure selected from the group consisting of an alkene, a 1,3-diene, a 1,3,5 triene, a structure of the formula (V), a structure of the formula (VI), and a structure of the formula (VII);

(V)

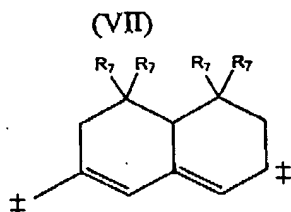


(VI)



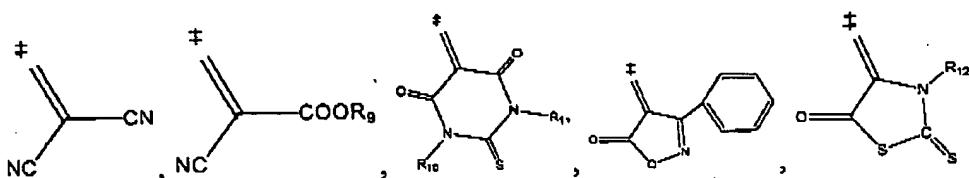
wherein Rd_1 - Rd_4 are each independently selected from the group consisting of a hydrogen atom, C_1 - C_{10} alkyl, and C_6 - C_{10} aryl;

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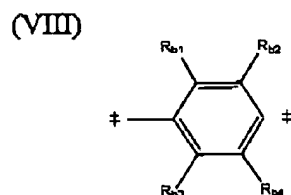
wherein R_7 represents H or C_1 - C_{10} alkyl; and

wherein EAG is an electron acceptor group represented by a structure selected from the group consisting of



wherein R_9 , R_{10} , R_{11} , and R_{12} are each independently selected from the group consisting of a hydrogen atom, C_1 - C_{10} alkyl, and C_6 - C_{10} aryl.

15. (Original) The composition of Claim 13 in which G in formula (IIIa) is represented by the formula (VIII):



wherein EAG is selected from the group consisting of SO_3R_{13} , NO_2 , $C(O)OR_{13}$, SO_2R_{13} , $S(O)R_{13}$, $C(O)R_{13}$, CN, and $C(O)NR_{14}R_{15}$, in which C(O) represents a carbonyl group and S(O) represents a sulfoxide group; and

wherein R_{b1} , R_{b2} , R_{b3} , R_{b4} , R_{b5} , R_{13} , R_{14} , and R_{15} are each independently selected from the group consisting of a hydrogen atom, C_1 - C_{10} alkyl, and C_6 - C_{10} aryl.

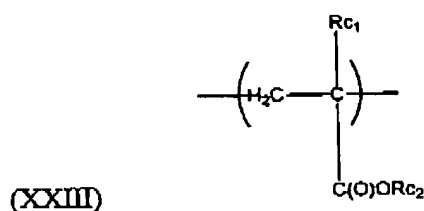
16. (Original) The composition of Claim 14 in which the NLO chromophore is (4-(homopiperidiny)benzylidene)malonitrile.

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17. (Original) The composition of Claim 12 in which the NLO chromophore is covalently bonded to the polydioxaborine.

18. (Original) The composition of Claim 1 in which the polydioxaborine comprises a plasticizing recurring unit.

19. (Original) The composition of Claim 18 in which the plasticizing recurring unit is represented by the formula (XXIII):



wherein Rc₁ and Rc₂ are independently selected from the group consisting of C₁-C₁₀ alkyl and C₁ - C₁₀ alkenyl.

20. (Original) The composition of Claim 19 in which (XXIII) is selected from the group consisting of 2-ethylhexylacrylate, butylacrylate, and butylmethacrylate.

21. (Original) The composition of Claim 20 having a glass transition temperature of about 100° C or less.

22. (Currently amended) A composition comprising a polydioxaborine having a weight average molecular weight of about 1,000 or greater, an NLO chromophore and a photosensitizer.

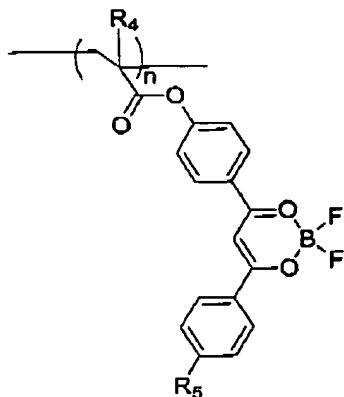
23. (Original) The composition of Claim 22 in which the photosensitizer is a charge-transfer complex.

24. (Original) The composition of Claim 23 in which the charge-transfer is formed between at least a part of the NLO chromophore and the polydioxaborine.

25. (New) A composition comprising a polydioxaborine and an NLO chromophore, wherein the polydioxaborine comprises a recurring unit of the formula (II):

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(II)



in which R_4 and R_5 are each independently selected from the group consisting of a hydrogen atom, C_1 - C_{10} alkyl, and C_6 - C_{10} aryl.